I-285 Asphalt Shoulder Replacement with Roller Compacted Concrete Atlanta, GA

Virginia Concrete Conference
March 10, 2006

Project Location

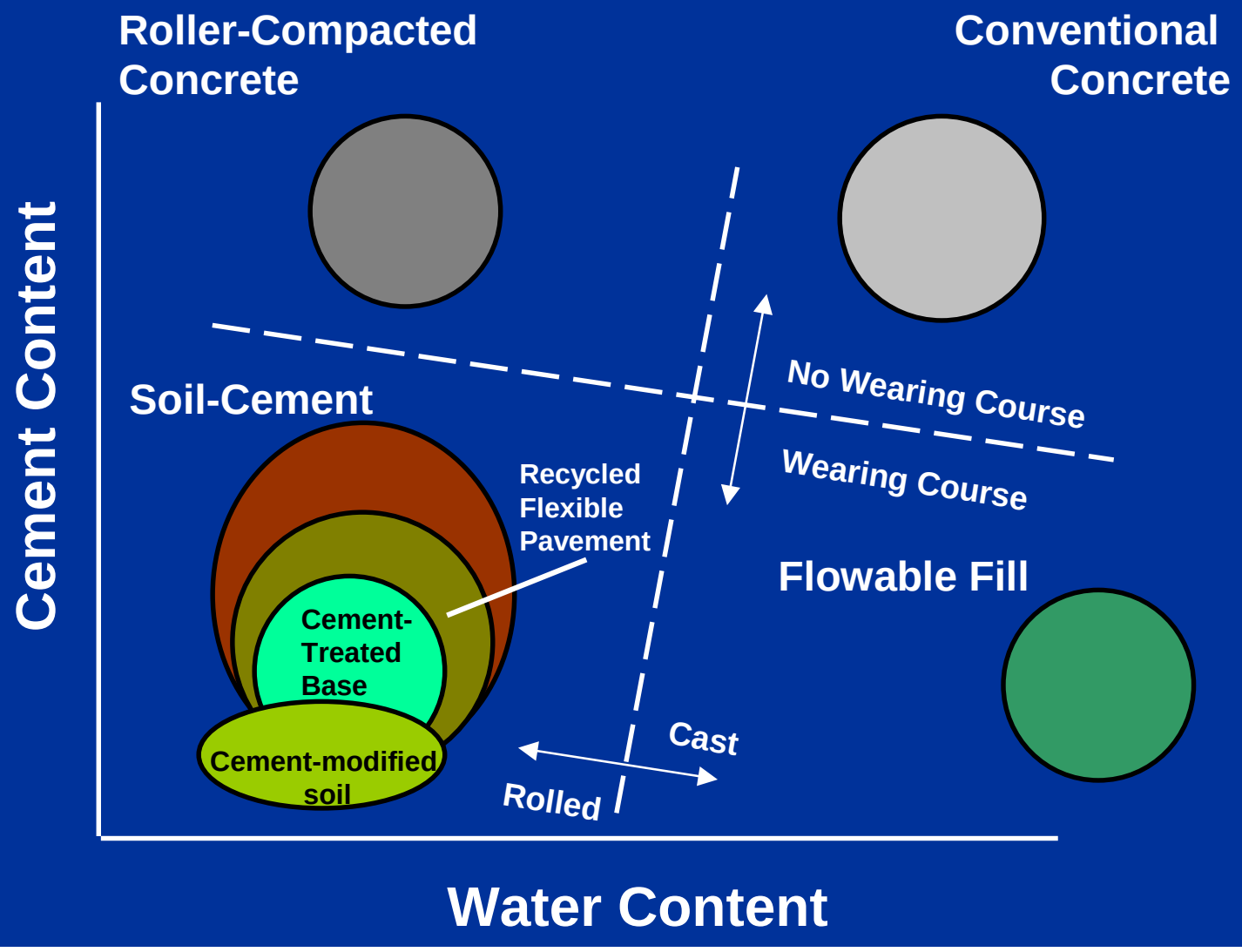
Definition

"Roller-Compacted Concrete (RCC) is a no-slump concrete that is compacted by vibratory rollers."

- Zero slump (consistency of damp gravel)
- No forms
- No reinforcing steel
- No finishing
- Consolidated with vibratory rollers

Concrete pavement placed in a different way!

Cement-Based Pavement Materials



Why Use RCC on I-285?

Ease of Placement

Durability

Successful Projects Elsewhere

Cost Effective


HEAVY TRUCK CORRIDOR

I-285 Prior to Construction

The Project

NHS – M001-00(534)01

17.3 miles of shoulder reconstruction with RCC, PCC slab replacement, various bridge joint replacements, and safety upgrades including guardrail, recovery zone improvements, rumble strips and wet reflective striping

The Project

Let: July 2004

- RCC Subcontractor: A. G. Peltz – Birmingham, AL
- Total Contract Price: $20,168,734

  RCC cost: $ 4.3 million
- Start Date: September, 2004

  Completion Date: November, 2005
- RCC Paving: October thru November, 2004

  March thru early August, 2005

  22 week-ends

Comparisons

- Total cost associated with RCC: Approx. $8 million
  - Associated costs include grading, saw-cutting, joint sealing, etc.
  - RCC Contract Price: $115 per cubic yard
- Cost if asphalt had been used: Approx. $7.35 million
  - Based on estimated cost of $42 per ton
- Differences:
  - RCC goes down in one lift and asphalt requires two or three lifts for same depth creating the need for more traffic control and additional time
    - Less impact to traveling public
    - Safer for workers and motorists
  - It is anticipated that RCC will have a useful life about two times that of asphalt resulting in lower long-term maintenance costs

Contract Specifics

- New shoulder width of 10 to 14 feet
- South of I-20, RCC six inches deep
- North of I-20, RCC 8 inches deep with 8 inches of GAB
- Contract calls for approx. 38, 500 cubic yards of concrete (203,000 sq. yds)
- Work hours restricted primarily to weekends
  - 9:00 p.m. Friday until 5:00 a.m. Monday
  - Holiday restrictions
- Traffic counts at approx. 140,000 ADT
- Truck Traffic: 15% (7000 trucks in OSL per day)

Typical Construction Schedule

- Removal of shoulders began Fri. Night at 9:00 PM.
- Typically removed between 1.5 and 2 miles.
- RCC placement began Sat. at 5:00 AM and continued until 6:00 PM. Began again Sun. at 5:00 Am and continued until completion.
- All lanes must be reopened by 5:00 AM Monday.

Design and Acceptance

RCC: Required 28-day Mix Design Strength of 4,000 psi

Acceptance based on density- 98% AASHTO T-180 or 28-day core strenght of 3500 psi

Core strength averaged 3980 psi

Cylinder strenght averaged 3964 psi

Design Loading Analysis

Table 1				
RCC Thickness Required	Allowable Interior Load Repetitions Over Lifetime of RCC Pavement	Design Life in Years		
		20 yr	10 yr	5 yr
		Allowable Daily Repetitions		
5.5	25977	4	7	14
6	121504	17	33	67
6.5	432506	59	118	237
7	1000000	500	1000	2000

Old Material Removed

Old Material Removed

Base Prepared for Compaction

Base Ready for Compaction

Base Compacted

Concrete Plant

New Concrete Placed

New Concrete Placed

Material Placement

Spreader

Short Cure Rate

Initial Roller Compaction

Initial Roller Compaction

Roller Compaction

(rubber-coated drum)

Curing

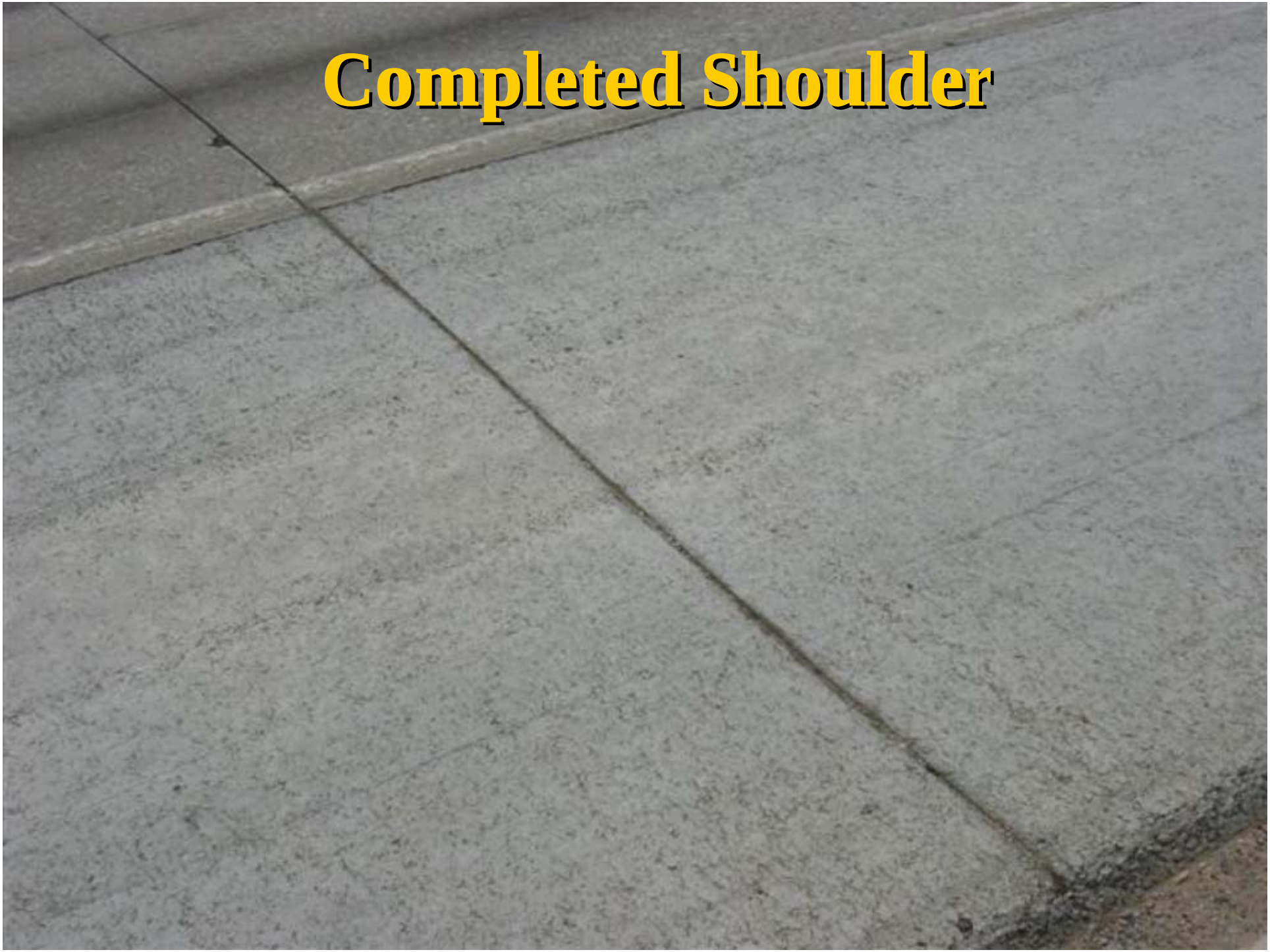

Quality Control


Quality Control

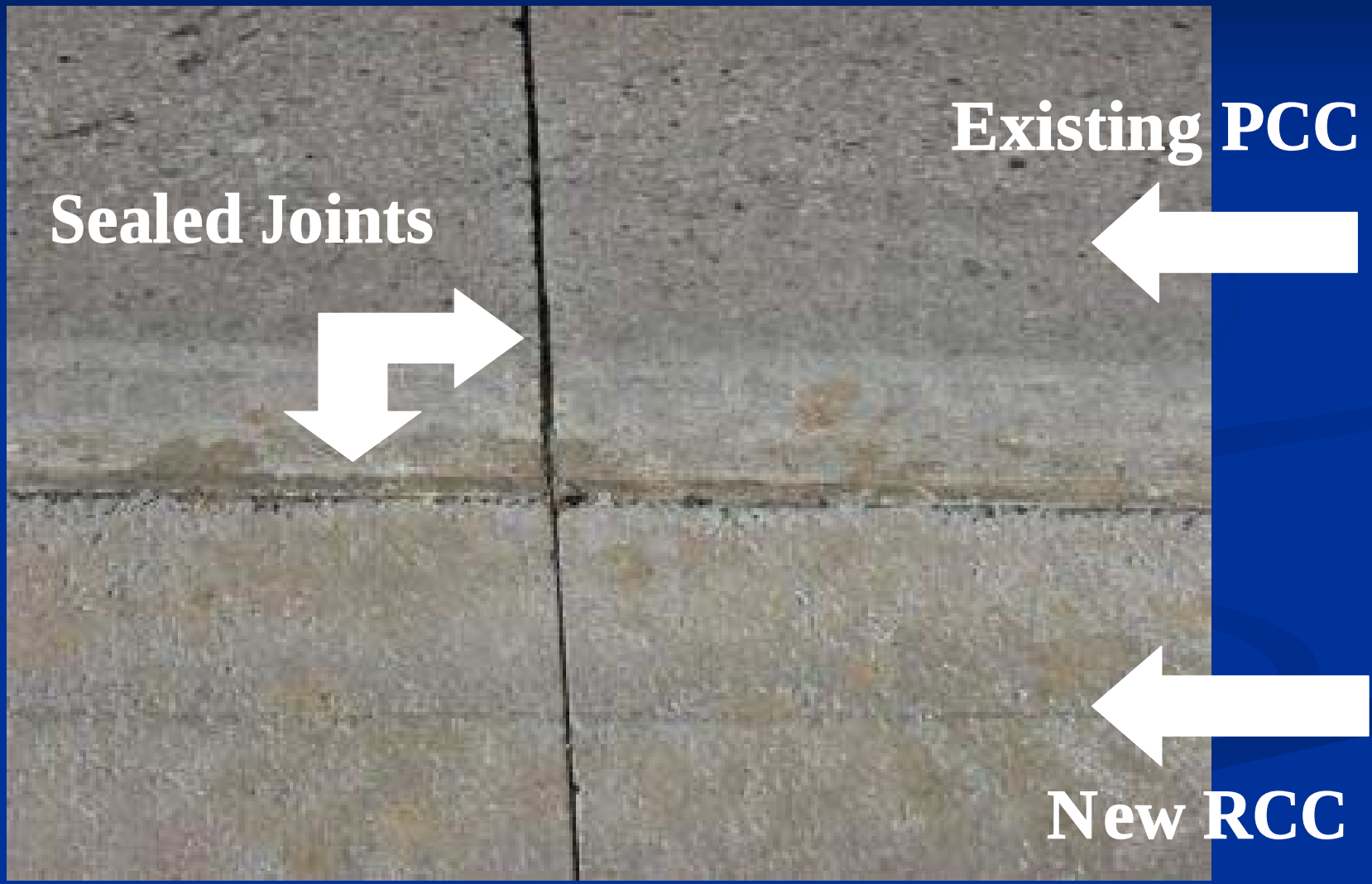

DOT
20 3 2005

Saw Cut Joints

Completed Shoulder



Joint Intersection



Rumble Strips

Finished Product

Finished Product


QUESTIONS OR COMMENTS